

5

CLAIMS

What is claimed is:

1. A composition comprising ~~recombinant~~ gelatin.
2. A recombinant gelatin having a molecular weight selected from the group consisting of about 5 kDa, about 8 kDa, about 9 kDa, about 14 kDa, about 16 kDa, about 22 kDa, about 23 kDa, about 36 kDa, about 44 kDa, and about 65 kDa.
3. A recombinant gelatin having a molecular weight range selected from the group consisting of about 0 to 50 kDa, about 10 to 30 kDa, about 30 to 50 kDa, about 10 to 70 kDa, about 50 kDa to 70 kDa, about 50 to 100 kDa, about 100 to 150 kDa, about 150 to 200 kDa, about 200 to 250 kDa, about 250 to 300 kDa, and about 300 to 350 kDa.
4. A recombinant gelatin having a molecular weight greater than 300 kDa.
5. A recombinant gelatin having a Bloom strength selected from the group consisting of 50, 100, 150, 200, 250, and 300.
6. A recombinant gelatin having a Bloom strength off between 0 and 100.
7. The composition of claim 1, wherein the recombinant gelatin is partially-hydroxylated.
8. The composition of ~~claim~~ 1, wherein the recombinant gelatin has a percentage hydroxylation selected from the group consisting of 20 to 80%, 30 to 80%, 40 to 80%, 60 to 80%, 20 to 60%, 30 to 60%, 40 to 60%, 20 to 30%, 20 to 40%, and 30 to 40%.
9. The composition of claim 1, wherein the recombinant gelatin is non-hydroxylated.
10. The composition of claim 1, wherein the recombinant gelatin is fully hydrolyzed.
11. The composition of claim 1, wherein the recombinant gelatin is partially hydrolyzed.

- 5 12. The composition of claim 1, wherein the recombinant gelatin comprises a homogenous mixture of recombinant gelatin polypeptides.
13. The composition of claim 1, wherein the recombinant gelatin comprises a heterogeneous mixture of recombinant gelatin polypeptides.
- 10 14. The composition of claim 1, wherein the recombinant gelatin is derived from one type of collagen free of any other collagen.
- 15 15. The composition of claim 14, wherein the one type of collagen is selected from the group consisting of type I, type II, type III, type IV, type V, type VI, type VII, type VIII, type IX, type X, type XI, type XII, type XIII, type XIV, type XV, type XVI, type XVII, type XVIII, type XIX, and type XX collagen.
- 20 16. The composition of claim 1, wherein the recombinant gelatin has an endotoxin level below 1.000 EU/mg.
17. The composition of claim 1, wherein the recombinant gelatin has an endotoxin level endotoxin level below 0.500 EU/mg.
- 25 18. The composition of claim 1, wherein the recombinant gelatin has an endotoxin level endotoxin level below 0.050 EU/mg.
19. The composition of claim 1, wherein the recombinant gelatin has an endotoxin level endotoxin level below 0.005 EU/mg.
- 30 20. The composition of claim 1, wherein the recombinant gelatin is recombinant human gelatin.
- 35 21. A recombinant gelatin comprising an amino acid sequence selected from the group consisting of SEQ ID NOs: 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 30, 31, and 33.
22. An isolated and purified polynucleotide encoding an amino acid sequence selected from the group consisting of SEQ ID NOs: 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 30, 31, and 33.

- 5
23. An expression vector comprising the polynucleotide of claim 22.
24. A host cell comprising the polynucleotide of claim 22.
- 10 25. The host cell of claim 24, wherein the host cell is a prokaryotic cell.
26. The host cell of claim 24, wherein the host cell is a eukaryotic cell.
27. The eukaryotic host cell of claim 24, wherein the eukaryotic host cell is selected from
15 the group consisting of a yeast cell, an animal cell, an insect cell, a plant cell, and a
fungal cell.
28. A transgenic animal comprising the polynucleotide of claim 22.
- 20 29. A transgenic plant comprising the polynucleotide of claim 22.
30. A recombinant gelatin comprising an amino acid sequence selected from the group
consisting of SEQ ID NOs:26, 27, 28, and 29.
- 25 31. A method of producing recombinant gelatin, the method comprising:
- (a) providing recombinant collagen or procollagen or fragments or variants
thereof; and
- 30 (b) processing recombinant collagen or procollagen or fragments or variants
thereof to produce recombinant gelatin.
32. The method of claim 31, wherein the recombinant collagen is recombinant human
collagen.
- 35 33. The method of claim 31, wherein the recombinant collagen or procollagen is
produced by co-expressing at least one polynucleotide encoding a collagen or
procollagen and at least one polynucleotide encoding a collagen post-translational
enzyme or subunit thereof.

0001033411000
779231

5

34. The method of claim 33, wherein the post-translational enzyme is prolyl hydroxylase.

35. A method of producing recombinant gelatin, the method comprising producing recombinant gelatin directly from an altered collagen construct.

10

36. The method of claim 35, wherein the recombinant gelatin is produced by co-expressing the altered collagen construct and at least one polynucleotide encoding a post-translational enzyme or subunit thereof.

15

37. The method of claim 35, wherein the post-translational enzyme is prolyl hydroxylase.

38. A method of producing recombinant gelatin having a selected melting temperature, the method comprising conferring on the recombinant gelatin a percentage hydroxylation that corresponds to the selected melting temperature.

20

39. The method of claim 38, wherein the conferring step comprises producing recombinant gelatin from an altered collagen construct in the presence of prolyl hydroxylase.

25

40. The method of claim 38, wherein the conferring step comprises deriving recombinant gelatin from hydroxylated recombinant collagen.

41. The method of claim 38, wherein the conferring step comprises hydroxylating non-hydroxylated recombinant gelatin.

30

42. A binding agent comprising recombinant gelatin.

43. An encapsulant comprising recombinant gelatin.

35

44. A stabilizing agent comprising recombinant gelatin.

45. A film-forming agent comprising recombinant gelatin.

46. A moisturizing agent comprising recombinant gelatin.

0001162201260

5/22/12

5

47. An emulsifier comprising recombinant gelatin.

48. A thickening agent comprising recombinant gelatin.

10

49. A gelling agent comprising recombinant gelatin.

50. A colloidal agent comprising recombinant gelatin.

51. An adhesive agent comprising recombinant gelatin.

15

52. A pharmaceutical composition comprising recombinant gelatin.

53. The pharmaceutical composition of claim 52, wherein the recombinant gelatin is human recombinant gelatin.

20

54. A hard gel capsule comprising recombinant gelatin.

55. A soft gel capsule comprising recombinant gelatin.

25

56. A plasma expander comprising recombinant gelatin.

57. A colloidal volume replacement material comprising recombinant gelatin.

58. A graft coating comprising recombinant gelatin.

30

59. A medical sponge comprising recombinant gelatin.

60. A medical plug comprising recombinant gelatin.

35

61. A pharmaceutical stabilizer comprising recombinant gelatin.

62. A micro-carrier comprising recombinant gelatin.

- 5 63. A kit, the kit comprising.
- (a) a composition comprising recombinant gelatin; and
- (b) a device for delivering the composition to a subject.
- 10 64. An edible composition comprising recombinant gelatin.
65. A protein supplement comprising recombinant gelatin
- 15 66. A fat substitute comprising recombinant gelatin
67. A nutritional supplement comprising recombinant gelatin
68. An edible coating comprising recombinant gelatin.
- 20 69. A photographic composition comprising partially-hydroxylated recombinant gelatin.
70. A photographic composition comprising fully-hydroxylated recombinant gelatin.
- 25 71. A cosmetic composition comprising recombinant gelatin.
72. An industrial composition comprising recombinant gelatin.
73. A cell culture composition comprising recombinant gelatin.
- 30 74. A composition for laboratory use comprising recombinant gelatin.